SOLVENT CONTAMINATED WIPERS
DATA COLLECTION EFFORT

QUALITY ASSURANCE PROJECT PLAN

WORK ASSIGNMENT 2-26

Submitted to

U. S. Environmental Protection Agency
Office of Solid Waste
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Crystal City, VA

Submitted by

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

This data collection effort is designed to 1) survey wiper and solvent use in selected industries, and 2) generate additional data points under controlled conditions that replicate those scenarios. Both the survey data collected and the laboratory data generated will be used to support a rulemaking, statement of policy, or guidance on the management of solvent-contaminated industrial wipers.

Ensuring that this rulemaking, policy or guidance is protective of human-health and the environment while not being overly restrictive of industry requires that the decision be based on data of known quality. This Quality Assurance Project Plan is intended to define and control the quality of data that will be generated, and to describe the limitations of the data.

Two types of data will be collected in this effort: 1) weights of contaminated and uncontaminated wipers, both in the laboratory and in industrial settings, and 2) observations of materials, practices and rates of generation. Data quality is usually discussed in terms of the data quality indicators bias, precision and representativeness. The survey nature of this project, as opposed to a definitive analytical data collection effort, requires us to define these indicators in qualitative rather than quantitative terms.

The major contributor of bias to this project is that the facilities that will be visited during the survey are those that volunteered to have EPA observe their processes and waste management practices. It is quite possible, even likely, that these facilities do a better job of waste management than facilities that were less willing to have EPA look over their shoulder for several hours. As such, they introduce a bias into the observations.

The precision of this project is defined by the variability of the use and management scenarios themselves. Precision will be maximized by making as many measurements as possible, thereby more closely defining the range of values for any given measurement, and the range of contamination for any given disposal scenario.

The survey data generated will be representative of industry practice to the extent that the industrial facilities visited are representative of the whole. Similarly, the laboratory data generated are not intended to be representative of the industrial data, rather, they are intended to define the boundaries of solvent contamination on wipers under specific use scenarios, by testing solvents and wipers that bracket the range of volatilities and absorptivities used in industrial practice.

1. PROJECT ORGANIZATION AND RESPONSIBILITY

General responsibilities of the Project Manager, the Work Assignment Manager, Technical Staff, and QA Reviewer are provided in Sections 1.1 through 1.4. The organizational structure is illustrated in Figure 1.

1.1 Project Manager

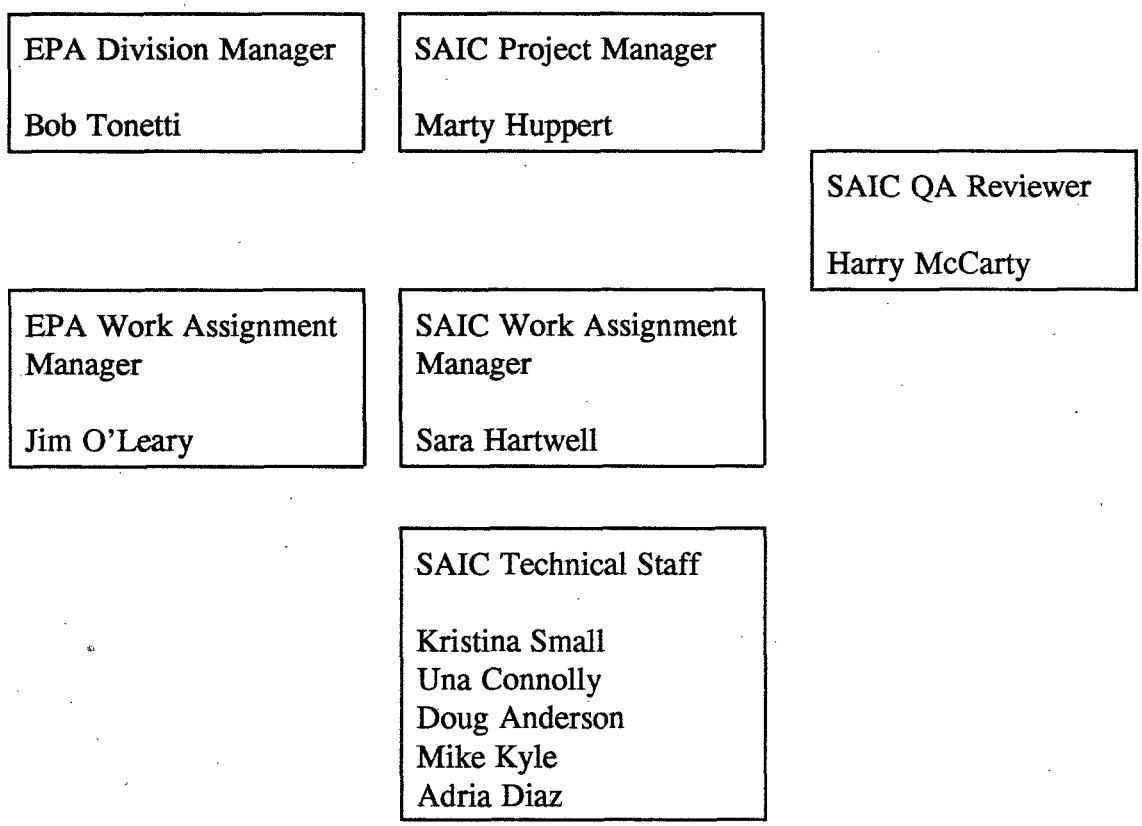
Mr. Marty Huppert is the Program Manager of the Industrial, Hazardous and Solid Waste Characterization Support contract. As the Project Manager, he has technical oversight of the program, and is responsible for assuring SAIC corporate management that the work is conducted in accordance with the QA requirements of the contract. Mr. Marty Huppert will:

- Evaluate staff credentials to assure that they conform to the QA requirements for training and experience.
- Ensure that the program is appropriately organized with effective lines of communication. Ensure that program responsibilities and authorities for making critical QA decisions are clearly understood.
- Distribute and enforce the Quality Assurance Project Plan.
- Consult with the EPA Project Officer on any proposed deviations from the Quality Assurance Project Plan. Approve deviations from the Quality Assurance Project Plan with consent from the EPA Project Officer.
- Review QA reports from the QA Reviewer, and review and evaluate responses from the Work Assignment Manager. Ensure that any actions taken are timely and appropriate.
- Report program status, problems and corrective actions as required by the contract and the Quality Assurance Project Plan.
- Review work products and reports to assure that QA goals were met. Approve technical reports.
- Communicate with the EPA Project Officer on issues relating to the definition and conduct of the work assignment. Inform the EPA Project Officer of Work Assignment status.

1.2 Work Assignment Manager

Ms. Sara Willis Hartwell is the Manager of Work Assignment 2-26, "Implementation of Solvent Contaminated Wipers Data Collection Strategy." As the Work Assignment Manager,

Figure 1
Project Organization



she has overall technical oversight of the work performed by SAIC. She is responsible for assuring the Project Manager that the work is conducted in accordance with the QA requirements. Ms. Hartwell will:

- Ensure that the program is appropriately organized with effective lines of communication. Ensure that program responsibilities and authorities for making critical QA decisions are clearly understood.

- Ensure that the QA Reviewer is involved in the project from the planning stage to the issuance of the final report, is fully informed, and is kept apprised of program schedules.

- Inform all staff of program and project QA requirements.

- Review and approve Standard Operating Procedures (SOPs), ensuring that program QA requirements are addressed.

- Review all QA reports from the QA Reviewer, and formulate and implement responses where appropriate. Ensure that any problems detected are immediately communicated to the appropriate staff, that actions taken are timely, appropriate, and documented in the program records.

- Report project status, problems, corrective actions as required by the contract and Quality Assurance Project Plan.

- Ensure the effective and timely completion of all tasks, and ensure that all project deadlines are met.

- Review work products and reports to assure that QA goals are met. Ensure that critical data are adequately verified or validated and approve technical reports.

- Report work assignment status to the Project Manager.

- Communicate with the EPA Project Officer when technical guidance is required for the conduct of the work assignment. Documents this technical guidance to the Project Manager.

1.3 QA Reviewer

Dr. Harry McCarty is the QA Reviewer for this Work Assignment, As the QA Reviewer, he is responsible for keeping the Project Manager, the Work Assignment Manager and technical staff informed of the QA/QC compliance status of all project activities, and of any QA/QC problems. Dr. McCarty will:

- Distribute and enforce the Quality Assurance Project Plan. Maintain a record of all

personnel with copies of the Quality Assurance Project Plan, ensuring that all personnel receive all updates and corrections to the Quality Assurance Project Plan.

- Review any proposed deviations from the Quality Assurance Project Plan with the Project Manager.
- Inform all staff of program and project QA requirements
- Review SOPs with the Work Assignment Manager, assuring that program QA requirements are addressed.
- Report audit results along with any problems and corrective action requests to the WA Manager and Project Manager.
- Review and document all corrective actions with the Project Manager and WA Manager.
- Report QA/QC program status to the Project Manager and Work Assignment Manager.

1.4 Technical Staff

Technical staff and supervisors report administratively to SAIC division management and report on project matters to the SAIC Work Assignment Manager. Staff are responsible for conducting work in accordance with division, program, and project QA requirements. Technical Staff:

- Follow this Quality Assurance Project Plan and any SOPs.
- Obtain approval for deviations from the Quality Assurance Project Plan or SOP from the Project Manager through the Work Assignment Manager.
- Report work assignment status to the Work Assignment Manager.
- Immediately report QA problems to the Work Assignment Manager and the QA Reviewer, and help resolve the problems.

2. PROBLEM DEFINITION AND BACKGROUND

Under RCRA, a waste that is mixed with, or that contains a hazardous waste, is by definition a hazardous waste. In this context, an industrial wiper, whether disposable or reusable, to which a listed solvent is applied becomes a hazardous waste and requires special handling. This type of hazardous waste is produced by thousands of printers, auto manufacturers, mechanics, and collision repair specialists, furniture manufacturers, and other generators who rely on solvents and wipers in their daily operations.

Risk to human health and the environment may result from the improper handling, storage, treatment, transport, and disposal of these industrial wipers contaminated with listed solvents. Significant factors influencing this potential risk include:

1) the toxicity and volatility of solvents used on the wiper in the workplace, determined by the composition of the solvent and the amount of solvent used;

2) the absorptivity of the wiper, determined by its composition and construction;

3) whether any solvent is extracted from the used wiper through the use of removal technologies such as mechanical wringers, screen-bottom drums, or centrifuging;

4) how the contaminated wipers are handled and stored prior to disposal or laundering;

5) the type of safeguards, if any, employed in transportation of the used wipers;

6) ultimate disposition; i.e., landfill, industrial laundry, incineration, fuel blending, or solvent recovery; and

7) the effects of any co-contaminants picked up during the industrial process, i.e., inks, oil, wax, etc. These co-contaminants may pose a threat due to their own inherent toxicity, or they may alter the risk posed by the solvent-contaminated rag through such mechanisms as increased solvent volatility.

While any combination of these factors can influence whether the contaminated wiper does or does not pose an unacceptable risk to the environment, the first four factors are predominant and influence potential risks which may be realized in the form of groundwater contamination, releases to surface waters, and uncontrolled air emissions.

At issue is whether situations exist where wipers contaminated with listed solvents pose an unacceptable risk to human health and the environment such that these wipers must be regulated as a hazardous waste.

3. PROJECT DESCRIPTION

Under Work Assignment No. 2-26 of Contract No. 68-W4-0042, SAIC is providing support to EPA in identifying the combinations of factors that will allow solvent contaminated wipers to be handled and disposed of without adverse effects on human health and the environment. The data collected may be used as the basis for the development of a guidance policy and/or the development of a proposed rulemaking that will: 1) foster pollution prevention, 2) ensure sound waste management for contaminated wipers, and 3) minimize the complexity of the generator's decision-making process, especially with regard to determining if a hazardous waste has been generated.

The data collection effort will be implemented in two phases: 1) collection of data at industrial facilities while wipers are being used and disposed of, and 2) collection of data in a laboratory setting, using solvents and wipers that have been pre-selected to bracket the range of solvent volatilities and toxicities, and wiper absorptivities, that are found in industrial use. In both cases, data will be collected gravimetrically (weighing with portable electronic balances). The data will be collected according to the data collection strategy formulated under Work Assignments 1-17 and 2-17 of this contract. Section 3.1 summarizes the preliminary data collected prior to formulation of the data collection strategy. Section 3.2.1 discusses Phase 1 of the data collection effort, and Section 3.2.2 discusses Phase 2. Section 3.3 summarizes the plan for evaluating the data with respect to risk to human health and the environment.

3.1 Preliminary Data

During preliminary data collection activities completed under WA 1-17 and 2-17, SAIC established that the most commonly used wipers consist of launderable shop towels, disposable cloth rags, and disposable paper wipers. The type of listed solvents used with these wipers varies significantly by and within an industry, in that they include both blended and neat (pure) solvents and because the use of solvent blends tends to be task-specific (blanket wash, cleaner, coating/staining).

The industries which are the primary users of listed solvents on wipers are:

- printing,
- automotive manufacturing,
- automobile body shop and repair,
- aircraft manufacturing,
- aircraft maintenance and refinishing
- circuit board manufacturing, and
- furniture manufacturing/refinishing.

By reviewing hundreds of material safety data sheets (MSDS) completed by companies supplying solvents to these industries, SAIC has identified the range of composition of solvents and solvent blends typically used by each industry for specific tasks. While there are variations within each industry, the data indicate that the solvents used for a given task within a given industry are similar in composition (Attachment 1).

By observing the use of solvents on wipers in several of the identified industries, SAIC has identified the range of wiper types in use; including launderable wipers that are fairly uniform in thickness and surface area, disposable cloth wipers that are heterogeneous in terms of surface area and composition, and disposable paper wipers that range from small, minimally absorptive wipers, through home-use paper towels, to large, very absorptive paper wipers. Not only do these wipers vary considerably in the amount of solvent that they can absorb, the solvents are applied in varying quantities: some generators apply only a small quantity of solvent or solvent blends to the wiper, while others saturate it entirely.

Our observations also led to the conclusion that used wipers are managed in widely divergent manners:

- Reusable cloth wipers are stored prior to shipment to the laundry, sometimes in containers that are not compliant with RCRA requirements. Some facilities recover a portion of the solvent from these wipers using mechanical wringers or centrifuges, while others do not. Recovered solvent is either reused, recycled, or disposed of as a hazardous waste. Wipers were used in both single-and multiple-use applications.

- Disposable paper wipers are stored prior to disposal in a variety of scenarios: 1) closed containers, compliant with RCRA requirements, 2) open containers that are not compliant with RCRA, or 3) or in no container at all, also not RCRA compliant. Aside from the fact that many of these materials are not stored in a manner that is compliant with the regulations, the manner in which they are stored prior to disposal strongly influences the amount of solvent that remains on the wiper at the time of disposal. In one of the facilities visited, a mechanical wringer was used to recover a portion of the waste solvent from the disposable paper wiper prior to storage and disposal. Disposable paper wipers were used in both single- and multiple-use applications.

- Only one facility that was visited used disposable cloth wipers. No solvent was recovered, and the wipers were stored in closed containers prior to disposal as a hazardous waste.

These observations were used to focus the development of this data collection strategy. The strategy comprises four distinct data collection activities: 1) determining the removal efficiency of extraction technologies (i.e., centrifuge or mechanical wringer) under various use scenarios; 2) calculating the rate of solvent evaporation in a closed container; 3) discerning the effectiveness of screen-bottom containers; and 4) understanding the conditions under which industrial cloths do not pose a risk to human health and the environment.

3.2 Approach to Data Collection

Data will be collected in two phases: 1) industrial data and 2) experimental (controlled-variable) data. Each phase is discussed in subsequent sections.

3.2.1 Phase 1 - Data Collection at Industrial Sites

Data will be collected from the following industrial sectors::

- flexographic and screen printing,
- furniture refinishing
- auto maintenance and repair
- circuit board manufacture

The data to be collected are specified on the reporting form provided in Attachment 2. The intent of the data specifications is to gather sufficient information to describe the life cycle of the wiper as it is used industrially, collecting information on:

- the composition of the solvent used, by retrieving copies of the MSDS;
- the average amount of solvent applied to wiper and the manner in which it is applied;
- type of wiper used;
- frequency of usage (multiple or single usage before disposition of the wiper, time interval of usage);
- management of wiper after use (the type of extraction technology used, the volume of solvent extracted, the disposition of the extracted solvent and the used wiper);
- amount of solvent on wiper after employment of removal technology;
- amount of solvent on wiper prior to final disposition.

The reporting form provided in Attachment 2 assumes that the mass of co-contaminants on used wipers will probably prevent the accurate conversion of volumetric measurements to mass equivalents. Therefore, the protocol specifies the collection of gravimetric data (weight data) whenever possible. The plan is to collect data on a minimum of six wipers at each facility visited. If the opportunity exists and time allows, data will be collected from additional wipers. Facility names will be coded on the data collection forms so that it will not be apparent to the casual observer which facility the data were obtained from. Each facility visited will be given the opportunity to make and retain a copy of the completed data reporting form.

The data collected in this phase will be analyzed in comparison to the data collected in Phase 2. The data are expected to be more variable than that generated in Phase 2, an expectation consistent with the increased variation normally encountered in industrial settings vs. laboratory environments. Preliminary analysis of these data may be used to refine the Phase II data collection if results indicate that planned experiments may yield inadequate or insufficient data.

3.2.2 Phase 2 - Data Collection through Experimental Design

During Phase 2, data will be collected through laboratory experiments. These experiments will 1) augment the previous industrial data collection efforts on removal efficiencies for centrifugation and mechanical wringing under various use scenarios, 2) estimate the rate of evaporation of solvents from industrial wipers in closed containers; 3) examine what happens when contaminated rags are stored in a screen-bottom drum; and 4) evaluate the scenario of a

wiper that is used over a long period of time prior to disposition.

3.2.2.1 Experiment No. 1 - Evaluation of Removal Efficiencies of Treatment Technologies

This experiment will evaluate the removal efficiency of wringer and centrifuge treatment technologies on disposable and reusable wipers. The experiment will focus on collecting data on the key variables:

- absorptivity of the range of wipers, towels and rags;
- volatility of the solvents used by industry; and
- removal technologies.

In addition, the experiments will attempt to evaluate the effect of co-contaminants on removal efficiencies.

Wipers bracketing the range of absorptivity of each wiper type (minimally, moderately, and maximally absorptive) will be identified in cooperation with representatives of the affected industries (disposable paper wipers, disposable cloth wipers, and reusable cloth wipers). Sufficient quantities of the identified wipers will be obtained through industry contacts or commercial purchase.

Attachment 1 provides solvent compositions used by the targeted industries identified through exhaustive searches of MSDS files. Based on the information presented here, we will identify solvents in a matrix, as presented in Exhibit 1, as being representative of the components used by each industry, and bracketing the range of volatilities found. Solvents will also be selected to maximize the number of solvents tested, and to specifically include the petroleum distillate cuts (solvents with boiling ranges rather than boiling points) commonly used in these industries.

An industrial laundry-type centrifuge with an explosion-proof motor, and a mechanical wringer will be obtained through short-term commercial lease or through loan.. Experiments will be conducted at SAIC's laboratory in San Diego, CA, or in other locations where experimental variables can be controlled (e.g., McCarty Water and Waste, Minnesota, MN).

Exhibit 2 outlines the variables that will be evaluated, and enumerates the number of samples that will be generated. At the beginning of the experiment, solvent volumes resulting in minimal, moderate and maximal wiper saturation will be determined. Attachment 2 provides a draft protocol and reporting format that will be used during data collection. The resulting data will be analyzed, estimating the efficiency of each technology at removing the specified solvents from each industrial wiper. The estimate will be made on a weight-% basis (the weight of solvent extracted divided by the weight of the wiper before extraction, multiplied by 100), and will be compared to the data obtained in Phase 1 to ascertain if additional data are required.

3.2.2.2 Experiment No. 2 - Estimation of Solvent Evaporation From a Closed Container

This experiment will evaluate the rate of evaporation of solvent from used industrial wipers disposed of in RCRA-compliant closed containers. The intent of the experiment is to evaluate the level of contamination, over time, of used rags that are managed correctly as hazardous wastes. In addition, stratification of solvent concentration through the contents of the container (increasing solvent concentration per rag from the top of the container to the bottom of the container) will be evaluated.

Exhibit 3 outlines the variables that will be evaluated during this experiment, and enumerates the samples that will be generated. The moderately absorptive wipers identified in Experiment #1 will be used, along with the most- and least-volatile solvents identified for each industry in Experiment #1. Each wiper will have a preset volume of solvent added to it (the volumes defined as minimally saturated and maximally saturated will be determined in Experiment #1). Two commercially-obtainable RCRA-compliant storage containers will be used, one large (25 gallons or more) and one small (5 gallons or less). Contaminated wipers will be added to the containers at preset intervals (30 minutes, 1 hour, 2 hours), and wipers will be removed and weighed after 8 and 24 hours of storage. The estimate of evaporation generated will be as a percentage of weight lost.

EXHIBIT 1			
	Low Volatility	*Moderate Volatility*	*High Volatility*
Low Toxicity			
Moderate Toxicity			
High Toxicity			

3.2.2.3 Experiment No. 3 - Evaluate Removal Efficiencies of Wipers Stored in Screen-Bottomed Drums

This experiment will evaluate the efficiency of a screen-bottomed drum as a RCRA-compliant storage device at removing excess waste solvent from used industrial wipers. As in Experiment #2, the intent of the experiment is to evaluate the level of contamination, over time, of used rags that are managed correctly as hazardous wastes.

Exhibit 4 outlines the variables that will be evaluated during this experiment and enumerates the samples that will be generated. The moderately absorptive wipers identified in Experiment #1 will be used, along with the moderately-volatile solvent identified for each industry in Experiment #1. Each wiper will have a preset volume of solvent added to it (the volume defined as maximally saturated, determined in Experiment #1). One commercially-obtainable RCRA-compliant screen-bottomed drum will be used. Contaminated wipers will be added to the containers at preset intervals (30 minutes and 2 hours), and the volume of solvent collected over 24 hours of storage

will be measured. The removal efficiency will be calculated on a weight-% basis (the weight of solvent collected, divided by the cumulative weight of solvent added to the drum, multiplied by 100).

3.2.2.4 Experiment No. 4 - Evaluate Effects of Continuous Use of the Same Wiper

This experiment will examine the rate of solvent loss from a wiper that is used repeatedly before final disposition. Exhibit 5 outlines the variables that will be evaluated during this experiment, and enumerates the samples that will be generated. The moderately absorptive wipers identified in Experiment #1 will be used, along with the solvents identified for each industry in Experiment #1. Each wiper will have a preset volume of solvent added to it (the volumes defined as maximally saturated in Experiment #1). Solvent loss will be measured gravimetrically.

3.3 Risk Analysis and Preliminary Findings

Subsequent to data collection, the data generated will be evaluated in conjunction with toxicity/risk data on the solvents used industrially with wipers, available from established databases.

The risk analysis phase will address solvent toxicity and disposal implications through the review and analysis of the toxicity of both blended and neat (pure) solvents for different management scenarios from available literature, including on-line searches of computerized databases. (This effort will take place concurrently with Phases I and II.)

The empirical data from Phases I and II will be compiled and analyzed with the risk analysis. The preliminary findings will identify if there are any clear-cut break points.

EXHIBIT 2
EVALUATE REMOVAL EFFICIENCIES OF TREATMENT TECHNOLOGIES

Disposable Paper Wipers

3	wiper types (very absorptive, moderately absorptive, minimally absorptive)
9	3 solvents (varying volatility) for each of 3 toxicity categories
3	levels of wiper saturation* (minimal, moderate, saturated)
2	technologies (wringer and centrifuge)
+20	samples to evaluate the effects of co-contaminants (samples gathered during industrial site visits)

182 samples

Disposable Cloth Rags

3	rag types (very absorptive, moderately absorptive, minimally absorptive)
9	3 solvents (varying volatility) for each of 3 toxicity categories
3	levels of rag saturation* (minimal, moderate, saturated)
2	technologies (wringer and centrifuge)
+20	samples to evaluate the effects of co-contaminants (samples gathered during industrial site visits)

182 samples

Reusable Towels

1	towel type
3	solvents (varying volatility) for each of 3 toxicity categories
3	levels of towel saturation* (minimal, moderate, saturated)
2	technologies (wringer and centrifuge)
+20	samples to evaluate the effects of co-contaminants (samples gathered during industrial site visits)

74 samples

*Levels of saturation will be defined based on use practices observed during industrial site visits

EXHIBIT 3
ESTIMATE RATE OF EVAPORATION IN A CLOSED CONTAINER

_2_ types of disposable wipers (1 paper/1 cloth)
_1_ type of reusable cloth wiper
_2_ solvent types (varying volatility)
_2_ levels of wiper saturation* (minimal and saturated)
_2_ container sizes (to minimize and maximize headspace)
_3_ frequencies of generation (30 minutes, 1 hour, 2 hours)
_2_ levels of duration (measure after 8 hours and 24 hours)
144 samples

EXHIBIT 4
EVALUATE REMOVAL EFFICIENCIES OF WIPERS STORED IN SCREEN-BOTTOM DRUM

_2_ types of disposable wipers (1 paper/1 cloth)
_1_ type of reusable cloth wiper
_1_ level of saturation* (saturated)
_2_ frequency levels
6 samples

EXHIBIT 5

EVALUATE EFFECTS OF CONTINUOUS USE OF SAME WIPER

_2_ types of disposable wipers (1 paper/1 cloth)
_1_ type of reusable cloth wiper
_1_ level of saturation*
_3_ types of solvent
_2_ frequencies of generation
18 samples

*Levels of saturattion will be defined based on use practices observed during industrial site visits

4. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The objectives of this work assignment are to 1) ensure that the data collected are representative of wipers and solvents as they are used in industry 2) generate sufficient data to support a regulatory or policy decision on management and disposal of solvent-contaminated wipers. Data quality indicators for this project are defined as follows:

- bias - The predominant potential for bias in this project is the fact that the industrial facilities to be visited are those that agreed to permit EPA to visit their facility. Because some facilities did not agree, there is a potential that we will be visiting shops that are more likely to manage their wastes in a RCRA-compliant manner. While the project objective is to have data that have as little bias as possible, there is very little that we can do to control for this potential bias.

- precision - The objective for precision for this data collection effort is defined as the performance tolerance of the balance. Replicate measurements will be made whenever possible as demonstration of analytical precision.

- representativeness - because the scenario that these data are to represent is so diverse, and the wipers, solvents and industrial applications are so variable, no quantitative measure of representativeness can be defined. The intent of the data collection effort is to survey wiper use in affected industries, and to generate controlled data in the laboratory that replicate the use scenarios observed in industry. Every effort will be made to identify the range of wipers, solvents, and management scenarios used, and to generate measurement data from combinations that bracket this range.

5. SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

All project staff will participate in at least one training session developed specifically for the Solvent Contaminated Wiper data collection work assignment. Attendance will be recorded at the training session, and attendance records maintained in the project files as documentation of training.

The training session will be conducted by the Work Assignment Manager, and will include presentation of:

- project background,
- data collection strategy,
- data collection procedures, including operation of the portable electronic balance, and the completing the data reporting form,
- QMP and QA procedures

6. DOCUMENTATION AND RECORDS

Work performed by SAIC under this work assignment will generate several types of records, primarily in the form of data reporting forms, manipulations of gravimetric data, and results of searches of computer databases. An example data reporting form is provided in Attachment 2.

As part of the project files, SAIC will document the process by which facilities were chosen for site visits, and by which wipers and solvents were selected for the laboratory testing phase. Any assumptions made during data collection or manipulation, or during toxicity/risk evaluation, will be clearly documented and noted in all draft and final reports.

Copies of these records will be provided to EPA for the regulatory docket, and will be maintained in project files along with other reports to EPA regarding project status and financial expenditures.

7. DATA ACQUISITION REQUIREMENTS

The data used in this project will be 1) gravimetric data generated on-site in industrial settings, 2) gravimetric data generated in a laboratory setting, 3) toxicity/risk data obtained from on-line searches of established databases.

Gravimetric data will be generated using portable electronic balances. Balances will be calibrated at the beginning, mid-point and end of each industrial site visit, and at least twice per work day during the laboratory experiments, using class "s" weights.

Data will be recorded as specified in the Attachment 2.

8. DATA MANAGEMENT

SAIC's data management efforts under this work assignment will focus on the 1) physical management of data record forms, 2) construction of a matrix of all industrial scenarios evaluated before the laboratory phase begins to ensure that all scenarios are included in subsequent experiments, and 3) maintenance of reports and data records suitable for construction of a regulatory/policy docket.

Attachment 2 provides a copy of the data reporting format. All data entries will be made in indelible ink. Any corrections to entries will be made in a manner that does not obscure the original entry. Notations of the reason for change/correction must be provided at the time of the change/correction, along with the date and initials of the person making the change.

9. ASSESSMENTS AND RESPONSE ACTIONS

SAIC's EHSG QA and Technical Review Policy requires some level of review of all work processes and deliverables to ensure that:

- Deliverables are appropriately focused on the requirements of the work assignments
- Analytical data and statistical evaluations are correct and valid
- Findings are consistent with analyses
- Data generated are precise, unbiased, complete and representative of the data source
- Recommendations are practical and responsive to Agency needs
- Work performed is within the scope of the work assignment and contract

The QA Reviewer will review the data collection strategy and SOPs for completeness, subsets of the data record forms and all trip reports from industrial sampling trips, and subsets of the data record forms and laboratory notes from the laboratory-based experiments. All audits by the QA Reviewer, as well as peer reviews, will be documented in the project files.

If any audit indicates an incomplete, imprecise, or biased data set, actions will be taken immediately to isolate those data and examine other, related data for similar bias. If those actions indicate a recurring problem, all data generated by that staff member/team will be pulled for review. The results of all corrective actions will be documented in the project files.

10. REPORTS TO MANAGEMENT

The following reports will be prepared and delivered, as well as maintained in the project files, at the specified frequency.

Project Status

The Work Assignment Manager will prepare a report detailing the technical progress and financial status at the close of each of SAIC's 4-week accounting cycles. This projects will include a summary by the QA Reviewer of QA activities during the reporting period. This status report will be provided to the EPA WAM and PO.

Results of Periodic Data Quality Assessments

The QA Reviewer will prepare a report detailing the results of any data quality assessments within one week of the completion of the assessment. The report will be provided to the SAIC WAM and Project Manager.

Significant Quality Assurance Problems and Recommended Solutions

If significant QA problems are identified during a performance evaluation, systems audit, or data quality assessment, or at any other time, a report will be prepared by the QA Reviewer describing the problem, providing recommended solutions, and specifying a corrective action schedule. This report will be provided to the SAIC WAM and Project Manager.

The QA Reviewer will prepare a follow-up report confirming that corrective action has been implemented and the problem corrected. This report will also be provided to the SAIC WAM and Project Manager.

11. DATA REVIEW, VALIDATION AND VERIFICATION REQUIREMENTS

Review and verification must include assessment of :

- the precision of the gravimetric data generated, and
- data transcriptions and manipulations.

See Section 12 for verification procedures.

12. VALIDATION AND VERIFICATION METHODS

The precision of the gravimetric data generated will be verified by checking the balance calibration with class "s" weights at the beginning, mid-point, and end of each industrial site visit, and at least twice per day during laboratory data collection.

Data transcriptions and manipulations will be verified by spot-check review of database search strings and results, transcriptions into spreadsheets, and spreadsheet formulae. The WAM and/or QAR will spot-check transcriptions and manipulations.

Finally, all results, conclusions, and recommendations will be reviewed and approved by senior staff.

ATTACHMENT 1
MSDS List

Printing Industry	Composition	CAS Number
Blanket Wash		
1,1,1-Trichloroethane	65-75%	71-55-6
2-Propanol	15-25%	67-63-0
Solvent Naphtha	5-15%	64742-95-6
1,2,4-Trimethylbenzene	trace	95-63-6
———		
Aliphatic Naphtha	<80%	64742-89-8
1,1,1-Trichloroethane	>20%	71-55-6
———		
Petroleum Distillate		8002-05-9
2-Butoxyethanol		111-76-2
———		
Hydro treated Heavy Naphtha	100%	64742-48-9
Trichlorofluoromethane (CFC-11)	16-21%	75-69-4
———		
Mineral Spirits	100%	64475-85-0
———		
Medium Aliphatic Naphtha	>1%	64742-88-7
Tetrachloroethylene	>1%	127-18-4
———		
Mineral Spirits	65-82%	64475-85-0
Aromatic 100	22-34%	64742-95-6
Worum DPM	0-10%	34590-94-8
———		
Mineral Spirits	40-55%	64475-85-0
Aromatic 100	50-70%	64742-95-6
———		
non-Phenolic Ethoxylates	0-10%	26027-38-3
Worum DPM	0-10%	34590-94-8
———		
Hydrocarbon	80%	
Trichlorofluoromethane	20%	75-69-4
———		
Stoddard Solvent	95-98%	8052-41-3
Petroleum Naptha	2-5%	64742-95-6
———		
Methylene Chloride		75-09-2
Benzin		8030-30-6
Other Non-Hazardous Ingredients		

Stoddard Solvent	100%	8052-41-3
1,2,4-Trimethylbenzene	2%	95-63-6
Aliphatic Petroleum Distillates	100%	64742-89-8
1,2,4-Trimethylbenzene	2% max	95-63-6
Tetrachloroethylene	25%	127-18-4
Stoddard Solvent	60%	8052-41-3
VM & P Naptha	15%	64742-89-8
Tetrachloroethylene	26%	127-18-4
Naptha	74%	
Petroleum Distillates	100%	8002-05-9
Hydro treated Heavy Naptha	100%	64842-48-9
Petroleum Distillates	82%	8002-05-9
Trichlorofluoromethane	21%	75-69-4
Mineral Spirits	Unknown	64475-85-0
Tetrachloroethylene	Unknown	127-18-4
Naptha	Unknown	8030-30-6
Hydrocarbon Solvent	55%	
Tetrachloroethylene	45%	127-18-4
Stoddard Solvent	95-98%	8052-41-3
Petroleum Naptha	2-5%	64742-95-6

Cleaner

Methyl Ethyl Ketone	9-18%	78-93-3
Toluene	19-32%	108-88-3
Acetone	25-41%	67-64-1
Methanol	12-30%	67-56-1
2-Propanol	0-11%	67-63-0
Solvent Naphtha	>9%	64742-89-8
Ethyl Acetate	>9%	141-78-6
Methyl Ethyl Ketone	>9%	78-93-3
Toluene	>9%	108-88-3
2-Propanol	>9%	67-63-0

Hexane	>85%	110-54-3
Isopropyl Alcohol	<15%	67-63-0
Water	75-85%	7732-18-5
Gum Arabic	5-10%	9000-01-5
Hydrogen Sulfate Sodium Salt	1-5%	1847-55-8
Petroleum Mineral Oil	1-3%	4742-06-9
White Mineral Oil	1-3%	8042-47-5
1,2,3,4-Tetrahydronaphthalene	1-3%	119-64-2
Phosphoric Acid	1-3%	7664-38-2
Pine Oil	1-3%	8002-09-3
Citric Acid	1-3%	77-92-9
Petroleum Distillate	1-3%	8052-41-3
VOL Organic CMPD		
Ethyl alcohol	70-80%	64-17-5
Ethyl Acetate	10-20%	141-78-6
Xylene	1-10%	1330-20-7
Medium Aliphatic Naptha	80%	64742-88-7
4-Isopropenyl 1-Methyl-Cyclohexane	20%	536-59-4
Stoddard Solvent	0-19%	8052-41-3
Super High Flash Naptha	0-19%	64742-95-6
Nitric Acid	4%	7697-37-2
Phosphoric Acid	3%	7664-38-2
Water	Unknown	7732-18-5

Thinner

Isopropanol	45-56%	67-63-0
n-Butanol	18-29%	71-36-3
Toluene	11-18%	108-88-3
Xylenes	3-17%	1330-20-7
Ethyl Benzene	0-2%	100-41-4

Furniture Industry

Lacquer Thinner

Aliphatic Petroleum Distillate	16%	
Aliphatic Alcohol	10%	
Aromatic Petroleum Distillate	1%	
Toluene	18%	108-88-3
o-, m-, p-Xylenes	8%	1330-20-7
Unreported	47%	

Aliphatic Naptha		64742898
VM & P Naptha		8032-32-4
Toluene		108-88-3
Methyl Ethyl Ketone		78-93-3
Isopropyl Alcohol		67-63-0
Isobutyl Alcohol		78-83-1
N-butyl Acetate		123-86-4

Refinisher

Methanol	<20%	67-56-1
Methylene Chloride	<30%	75-09-2
Acetone	>5%	67-64-1
2-Propanol	>5%	67-63-0

Acetone	35%	67-64-1
Methanol	25%	67-56-1
Methylene Chloride	25%	75-09-2
Toluene	20%	108-88-3

Methanol	<20%	67-56-1
Methylene Chloride	<30%	75-09-2
Toluene	<20%	108-88-3
Acetone	>5%	67-64-1
2-Propanol	>5%	67-63-0

Acetone	<30%	67-64-1
Methyl Chloride	<30%	75-09-2
Toluene	<20%	108-88-3
Methanol	<20%	67-56-1

Methylene Chloride	54%	75-09-2
Toluene	10%	108-88-3
Methanol	33%	37-56-1
Coating/Stain		
Mineral Spirits	66%	64475-85-0
Methyl Ethyl Ketoxime	<0.1%	96-29-7
Unreported	34%	
Resin/Oil	12%	
Iron Oxide	18%	1309-37-1
Mineral Spirits	67%	64475-85-0
Medium Aliphatic Naptha	80%	644742-88-7
Talc	5%	14807-96-6
Volatile Organic Compounds	15%	
Mineral Spirits		64742-47-8
Mineral Spirits, 140-Flash		64475-85-0
Talc		14807-96-6
Ethylene Glycol		107-21-1
Mineral Spirits	40-44%	64742-47-8
Mineral Spirits, 140-Flash	61%	64475-85-0
Titanium Dioxide	Trace	13463-67-7
Ethylene Glycol	<5%	107-21-1
VOC		
Mineral Spirits	40-44%	64742-47-8
Mineral Spirits, 140-Flash	40-44%	64475-85-0
Titanium Dioxide	0-18%	13463-67-7
Ethylene Glycol	<5%(for tinting)	107-21-1
VOC		
Titanium Dioxide	Unknown	13403-67-7
Calcium Carbonate	Unknown	1317-65-3
Hydro treated Light Petroleum Distillate	65-75%	64742-47-8
Naptha	5-10%	64742-88-7
Toluene	<5%	108-88-3

Ethylene Glycol	<5%(tinting)	107-21-1
Mineral Spirits	73-78%	64742-47-8
Mineral Spirits, 140-Flash		64475-85-0
Toluene	3%	108-88-3
VOC		
Stoddard Solvent	100%	8052-41-3
Stoddard Solvent	40%	8052-41-3
VOC	60%	
Petroleum Solvent	60%	8052-41-3
AMSCO 460 Solvent	1.7%	64475-85-0
Methanol	0.11%	67-56-1
Solvent G	3.8%	64742-94-5
Hi Flash Naptha	0.082%	64742-95-6
Anti-Oxidant	0.068%	96-29-7
Xylene	0.28%	1330-20-7
VOC		
VM & P Naptha	>57%	68032-32-4
Unreported	Unknown	
Linseed Oil Solvents	29-34%	
Mineral Spirits	67-72%	
Metal Soap Driers	<0.50%	
Suspending Agents	<0.50%	
Acetone	5%	67-64-1
Benzene Intended Change = 1C	<0.1%	71-43-2
2-Butoxyethanol	10%	111-76-2
Butyl Acetate	10%	123-86-4
Butanol	<5%	71-36-3
Cyclohexanone	<5%	108-94-1
DOP	<5%	6117-81-7
Ethyl Alcohol	<5%	64-17-5
Ethyl Acetate	<5%	141-78-6
Heptane	10%	142-82-5
Isobutanol/2-Methyl-1-Propanol/Isobutyl Alcohol	5%	78-83-1
Isobutyl Isobutyrate	5%	97-85-8
Isopropanol	5%	67-63-0
Methyl Ethyl Ketone	5%	78-93-3

Methylcyclohexanone	5%	1331-22-2
Wet Nitrocellulose	10%	9004-70-0
Light Aliphatic Naptha	10%	64742-89-8
Silicon Dioxide	<5%	7631-86-9
Toluene	15%	108-88-3
Mineral Spirits	20-25%	8032-32-4
Butyl Carbamate	<2%	55406-53-6
VOC		
Ethyltoluene	11.38%	611-14-3
Toluene	4.68%	108-88-3
Isopropyl Alcohol	0.18%	67-63-0
2-Butoxyethanol	21.18%	111-76-2
Acetone	36.96%	67-64-1
Petroleum Distillate	12.85%	8002-05-9
Light Aliphatic Naptha	2.64%	64742-89-8
M-xylene	1.13%	108-38-3

Paint Remover

Methylene Chloride	54%	75-09-2
Toluene	10%	108-88-3
Methanol	33%	67-56-1
Ammonia	5-8%	7664-41-7
Methylene Chloride	47-52%	75-09-2
Isopropyl Alcohol	15-20%	67-63-0
Sodium Chloride	0.1-1%	7775-11-3
Acetone	33%	67-64-1
Isopropyl Alcohol	33%	67-63-0
Toluene	33%	108-88-3
Chlorinated Hydrocarbon	80%	
Toluene	10%	108-88-3
Ethyl Alcohol	10%	
Methylene Chloride	<80%	75-09-2
Isopropyl Alcohol	<10%	67-63-0
Methanol	<5%	67-56-1
2-Butoxyethanol	<5%	111-76-2

Ammonia	5-8%	7664-41-7
Methylene Chloride	47-52%	75-09-2
Isopropyl Alcohol	15-20%	67-63-0
Sodium Chromate	0.1-1%	7775-11-3
VOC		
Methylene Chloride	66.5%	75-09-2
Paraffin Wax	2.5%	8002-74-2
Hydroxypropyl Cellulose	0.5%	9004-64-2
VM & P Naptha	7.2%	64742-48-9
Isopropyl Alcohol	10%	67-63-0
Ethanol	9%	64-17-5
Methanol	3.9%	67-56-1
Isopropanolamine PRG	0.4%	78-96-6
Methylene Chloride	36%	75-09-2
Phenol	16%	108-95-2
Sodium Chromate	1.8%	7775-11-3
VOC		
Methylene Chloride	>10%	75-09-2
Methanol	<15%	67-56-1
Toluene	>50%	108-88-3
Acetone	<25%	67-64-1
Methylene Chloride	<80%	75-09-2
Ethanol	<5%	64-17-5
Isopropyl Alcohol	<10%	67-63-0
Mineral Spirits	<5%	64742-47-8
Methylene Chloride	85%	75-09-2
Ethyl Alcohol	<5%	67-56-1
Propylene Oxide	<5%	75-56-9
Ethylene Glycol	<5%	107-21-1
Methylene Chloride	85%	75-09-2
Naptha	<5%	8030-30-6
Methanol	<5%	67-56-1
Methanol	5.8%	67-56-1
Methylene Chloride	92.5%	75-09-2

Methylene Chloride	<75%	75-09-2
Propylene Dichloride	10%	563-54-2
Methanol	5%	67-56-1
Chromate Salts	Trace	
Ammonia	4%	7664-641-7

Furniture Polish

White Mineral Oil	20%	8042-47-5
Medium Aliphatic Naphtha	70%	64742-88-7
Unreported	10%	

Isoparaffin Solvent	20-30%	64742-48-9
Unreported	70%	

Solvent

Acetone	20-30%	67-64-1
Isopropyl Alcohol	20-30%	67-63-1
Methyl Ethyl Ketone	20-30%	78-93-3
Naphtha	15-25%	64741-84-0

Acetone	20-30%	67-64-1
Isopropyl Alcohol	20-30%	67-63-0
Methyl Ethyl Ketone	20-30%	78-93-3
Naptha	15-25%	64741-84-0
Hexane	5-10%	110-54-3
Nitrocellulose	<10%	9004-70-0
Cyclohexane	<5%	110-82-7
VOC		

Turpentine	100%	8006-64-2

Auto Body Repair

Degreaser

Toluene	50%	108-88-3
VM&P Naphtha	50%	64742-89-8

VM&P Naphtha (Vapor Pressure 2)	50%	
VM&P Naphtha (Vapor Pressure 38)	50%	

Methylene Chloride	<10%	75-09-2
Benzin	>10%	8030-30-6
Propane	<10%	74-98-6
Kerosene	85-90%	8008-20-6
Propane	15-20%	74-98-6
Nitrogen	0.1-1%	7727-37-9
Kerosene	62%	8008-20-6
Nonylphenol	12%	9016-45-9
2-Butoxyethanol	4%	111-76-2
Hydrocarbon Propellant	21%	68476-86-8
Solvent Naptha	50-60%	64742-95-6
Toluene	10-20%	108-88-3
Nonylphenol Surfactant	10-20%	68412-54-4
Isobutane	1-10%	75-28-5
Propane	1-10%	74-98-6

Lacquer Thinner

Medium Mineral Spirits		64742-88-7
VM&P Naphtha		64742-89-8
Acetone	15-20%	67-64-1
Toluene	45-50%	108-88-3
Propylene Glycol monomethyl ether acetate	2-5%	108-65-5
Light Aliphatic Solvent Naphtha	15-20%	64742-89-8
Isopropanol	10-15%	67-63-0

Data Collection Protocol (Draft 5)

Site Demographics

Name of Organization (Coded):_____
Industrial Sector:_____
Ambient Temperature:_____
Existing Regulations Permits (Federal/State):_____
Operation/Task Description (Flow Diagram of Tasks Wiper Used In)

(draw on the back of this page)

Wipers

Type Of Wiper:_____
Manufacturer or Supplier:_____
Model, Part Number or Descriptive Name:_____
Physical Attributes of Wiper (Density/surface Area):_____
Average Weight of Wipers: (Weigh several unused wipers)

_____ _____ _____ _____ _____ _____

Solvents:

Type of Solvent(s) Used (Attach copy of MSDS):_____
Is solvent Listed or Characteristically Hazardous? (If yes, circle one)_____
Method of Solvent Application (spray, pump, pour, dip, etc.)_____
Estimated number of wipers used weekly/monthly or annually:_____
Estimated amount of solvent used weekly/monthly or annually:_____

Extraction Technology

Extraction Technology Used (if any) Circle one:
hand wringing centrifuge mechanical wringer other_____
Location of Extraction Technology: On-site/Off-site (circle one)
Is the equipment Owned/Leased/Rented/Contracted Service (circle one)
Extraction Conditions: (rpm, duration, spacing, etc.)_____

Wiper Use Information

1. Single use wiper/No extraction technology used (Go to page 2)
2. Single use wiper/Individual Wiper extraction technology (Go to page 3)
3. Single use wiper/Batch extraction technology (Go to page 4)
4. Multiple use wiper/no extraction technology used (Go to page 5)
5. Multiple use wiper/Individual Wiper extraction technology (Go to page 6)
6. Multiple use wiper/Batch extraction technology (Go to page 7)

Single Use Wiper/No Extraction Technology Used

Wiper Number	Time of Application	Weight After Application	Time of Disposition	Weight at Disposition	Weight After Marking

Weight of wiper after _____ hours in container
Number of Rags in Container _____
Time Since Container Last Emptied _____

Notes:

Single Use Wiper/Individual Wiper Extraction Technology Used

Wiper Number	Time of Application	Weight After Application	Time of Disposition	Weight After Use	Weight After Extraction	Weight After Marking

Weight of wiper after _____ hours in container
Number of Rags in Container _____
Time Since Container Last Emptied _____

Notes:

Single Use Wiper/Batch Extraction Technology Used

Wiper #	Time of Appl.	Wt. of Wiper after Appl.	Wt. of Wiper After Use

Weight of wiper after _____ hours in container
Number of Rags in Container _____
Time Since Container Last Emptied _____

Wt. of Wiper Before Extract.	Wt. of Wiper After Extract.

Notes:

Multiple Use Wiper/No Wiper Extraction Technology Used

Wiper Number	Time of Application	Use #	Weight before application	Weight after application	Time at Completion of Use	Weight After Use

Weight of wiper after _____ hours in container
Number of Rags in Container _____
Time Since Container Last Emptied _____

Notes:

Multiple Use Wiper/Individual Wiper Extraction Technology Used

Wiper #	Time of Appl.	Use #	Wt. Before Application	Wt. After Application	Time at Completion of Use	Wt. After Use	Wt. After Extraction

Wt. of wiper after __ hours in container
Number of Rags in Container ____________
Time Since Container Last Emptied ________

Notes:

Multiple Use Wiper/Batch Extraction Technology Used

Wiper #	Time of Appl.	Use #	Wt. Before Appl.	Wt. After Appl.	Time After Use	Wt. After Use	Wt. Before Extraction	Wt. After Extraction	Weight of wiper after _____ hours in container

Notes:

Wiper Disposition

Ultimate Disposition (circle one):

incineration	fuel blended	solvent recovered
laundry	other _____	landfill

If Multiple Use Wiper: Where Stored During Use: (pocket/counter/container?)

_____

Methods/Type of On-site Storage:

Type of Container:_____

Size of Container:_____

Number of Wipers in Container at Time of Sampling:_____

Time Since Container Last Emptied?_____

ASK FOR SAMPLES OF USED WIPERS

Container Survey		
Wiper #	Location In Container (Top, Middle, Bottom)	Weight

Date/Time of Data Collection:_____

Personnel Participating:

Industry _____

EPA:_____

Contractor:_____

Comments/Notes: